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ONTARIO WATER RESOURCES COMMISSION

REPORT ON

WATER POLLUTION SURVEY
# of the
OTTAWA RIVER
from
POINT FORTUNE TO TIMISKAMING

NOVEMBER 6th to 8th
1961

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Report on a water pollution survey of the Ottawa River from Point Fortune to Timiskaming /
Barrens, R.

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REPORT
ON A
WATER POLLUTION SURVEY
OF THE
Ottawa River
FROM
Point Fortune to Timiskaming

BY:

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November 6th to 8th

1961

REPORT ON

WATER POLLUTION SURVEY OF THE OTTAWA RIVER

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WATER POLLUTION SURVEY
OF THE
Ottawa River

INTRODUCTION

A water pollution survey of the Ottawa River was conducted by staff of the Ontario Water Resources Commission during the period of November 6th to 8th, 1961. An overall sampling programme was completed, with samples being collected from the waters of the Ottawa River at appropriate locations, as well as from the mouths of significant tributary watercourses. Sampling points on the river were selected at such locations as to ascertain the effects of municipal and industrial outfalls on the quality of the waters in the river.

This survey is part of a continuing programme to obtain information with respect to conditions in this watercourse.

GENERAL

Due to the imminent advent of adverse seasonal conditions for sampling, a concerted effort was made by Commission staff. The following staff members participated in this survey:

Sanitary Engineering Division:

C.E.McIntyre, P.Eng.
J.Kirch, P.Eng.

A.D.McConnell, C.S.I.(C.)
R.Barrens, C.S.I.(C.)
W.Vance, C.S.I.(C.)
W.McCourt

Laboratories & Research Division
Industrial Wastes Branch

G.Cousins, P.Eng.
J.Dart, P.Eng.

The co-operation and assistance which was received from the Ontario Department of Lands and Forests is appreciated.

OTTAWA RIVER WATERSHED

The Ottawa River drains an area of approximately 56,000 square miles in Ontario and Quebec. The watercourse forms the boundary between these two provinces for a distance of approximately 360 miles, from the head of Lake Timiskaming to the Carillon Rapids near Point Fortune.

Upstream from the City of Ottawa, the river broadens in many instances to form lake-like expanses. Numerous rapids occur between these lakes, as well as in the lower section of the river downstream from Ottawa. Dams for hydro-electric purposes have been constructed at several locations. The change in water surface elevation from Timiskaming to Point Fortune, a distance in excess of 300 miles, is approximately 520 feet.

EXTENT OF SURVEY

Commencing at Point Fortune where the Ottawa River departs from Ontario, samples were collected from the river water as far upstream as

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Timiskaming. Particular emphasis was placed on the sampling for determination of any adverse effects which may result to the quality of the waters of the Ottawa River from municipal and industrial waste discharges. Although the Ottawa River watershed is predominantly rural in nature, the larger centres of population, as well as the industries which are of prime concern to this survey, are located either on this river or near the mouths of tributaries thereof.

To complement the data of this survey, it will be desirable to repeat the sampling programme during the summer months.

Samples were collected from the waters of numerous tributaries at their mouths, in order to ascertain the intensity of pollution contributed therefrom to the Ottawa River at the time of this survey. Some of the places examined for pollution are indicated below:

South Nation River- receives untreated sewage from numerous small communities;

Lievre River- conducts sewage flows from Buckingham and Masson, P.Q., and industrial waste flows from two paper mills;

Green Creek- receives treated sewage flows;

Gatineau River- receives untreated sewage flows from Gatineau Point, P.Q.;

Brewery Creek- receives untreated sanitary sewage and slaughterhouse wastes from Hull;

Rideau River- conducts partially treated sewage;

Watts Creek- receives treated sewage flows from the Nepean temporary sewage treatment plant;

Mississippi River- receives partially treated flows from Almonte(pop.3300)and Carleton Place(pop.4700);

Madawaska River- receives untreated sewage flows from Arnprior(pop.5502);

Bonnechere River- receives untreated sewage flows from Eganville(pop.1454)and Renfrew (pop.8409);

Mattawa River- receives partially treated sewage flows from Mattawa(pop.3151);

Kipawa Creek- receives industrial wastes from a paper mill, as well as untreated sewage flows from Timiskaming, P.Q.

WATER USES

Municipal use of the waters of the Ottawa River is extensive. Although these waters presently may be used to an even greater extent, the following information with respect to some municipalities and centres of population is significant:

Municipality	Approx. Population	Water Supply	Sewage Treatment and Disposal
Hawkesbury	8730	Ottawa R.	Sewers-no treatment-to Ottawa R.
Lefaivre	200	Ottawa R.	No sewers
Rockland	2919	Ottawa R.	No sewers
Gatineau,P.Q.	10,650	Ottawa R.	No treatment- to Ottawa R.
Hull,P.Q.	51,600	Ottawa R.	Sewers-no treatment-to Ottawa R. & Brewery Cr.
Eastview	23,750	City of Ottawa	Sewers-no treatment-to Ottawa R.

Municipality	Approx. Population	Water Supply	Sewage Treatment and Disposal
Rockcliffe Pk.	2200	City of Ottawa	Sewers-no treatment-to Ottawa R.
Ottawa	255,600	Ottawa R. (2 plants)	Sewers-no treatment-to Ottawa R. (treatment works under construction)
Aylmer, P.Q.	4550	Ottawa R.	No treatment- to Ottawa R.
Pembroke	16,214	Ottawa R.	Sewers-no treatment-to Ottawa R.
Petawawa	1460	Ottawa R.	No sewers
Petawawa Army Camp- variable		Ottawa R.	Sedimentation treatment-to Ottawa R.
Chalk River-Atomic Energy of Can. Ltd.	1100	Ottawa R.	Imhoff tank- discharge to Ottawa River
Deep River	4800	Ottawa R.	Sewers- Imhoff tanks- to Ottawa River
Thorne	250-300	local creek	Sewers- no treatment- to Ottawa River
Haileybury	2550	Lake Timiskaming	Partly sewered-septic tanks- to L. Timiskaming

Where some rapids previously existed in the river, dams with generating stations have been constructed for the production of hydro-electric power. One such dam is approaching completion at the Carillon Rapids approximately 12 miles downstream from Hawkesbury. The retention of waters by this dam, and

the resulting change in water levels upstream therefrom, may affect the water quality in the river upstream almost to the City of Ottawa.

The Ottawa River may be the receiving waters, both directly and indirectly, for the effluents from future municipal sewage works, and the source for future water supplies at numerous municipalities located along the watercourse and on tributaries thereof.

Industrial use of the Ottawa River is also of importance. Although there are numerous other industries, including a large slaughter-house at Hull, pulp and paper mills are of significant concern in a water pollution survey of the Ottawa River in view of the large volumes of industrial waste discharged therefrom to the watercourse.

These pulp and paper companies adopted a positive approach to pollution control in 1959 when they voluntarily formed the Ottawa Valley Effluent Improvement Committee. The formation of the Committee has resulted in a co-ordinated approach to combatting the pollution problems arising from the pulp and paper mill industry in the Ottawa Valley. Considerable effort has been expended by these firms in their attempts to improve the quality of their industrial wastes discharging to the Ottawa River or its tributaries.

Pulp and paper mills discharge industrial wastes to the Ottawa River or its tributaries at the following locations:

Hawkesbury- direct access to the Ottawa River;

Thurso, P.Q. - via the Blanche River to the Ottawa River;

Buckingham and Masson, P.Q.- via the Lievre River to the Ottawa River;

Gatineau, P.Q.- directly to the Ottawa River;

Hull, P.Q., and Ottawa - directly to the Ottawa River;

Timiskaming, P.Q.- via Kipawa Creek to the Ottawa River.

Recreational use of the Ottawa River is notable due to the many summer residences located on the banks of the watercourse.

HYDROLOGY

Precipitation records are available from the Climatology Section, Meteorological Division, Department of Transport. Measurements which have been recorded at stations in the Ottawa River watershed indicate an average annual precipitation of 30 to 36 inches.

Stream flow data for the Ottawa River have been recorded for a considerable number of years at hydrometric stations on the watercourse. Flow records maintained since 1940 have been revised recently.

The following data pertaining to stream flows at two hydrometric stations on the dates of sampling have been obtained from the Water Resources Branch,

Department of Northern Affairs and National Resources, and from the Ontario Hydro-Electric Power Commission.

Location of Stream Gauging Station	Drainage Area in sq.miles	Dates of Sampling 1961	Average Daily Flows Recorded (in cfs.)
Ottawa R. at Grenville	55,560	Nov.6	36,900
		Nov.7	41,000
		Nov.8	42,000
Ottawa R. at La Cave Rapids(Otto Holden Generating Sta.)	18,500	Nov.6	24,487
		Nov.7	28,087
		Nov.8	27,434

The extreme flows recorded in the Ottawa River at Grenville are reported as follows:

Maximum- 326,000 cfs. on April 17th, 1951

Minimum- 23,960 cfs. on March 5th, 1934

The average daily flow recorded during the period of 1940 to 1959(19 years) was 69,100 cfs.

At the Otto Holden Generating Station(at La Cave Rapids), the extreme flows recorded are reported as follows:

Maximum- 129,000 cfs. on May 15th and 16th,1960;
Minimum- 0 cfs., for various single days with the power plant inoperative.

The average daily flow recorded during an 8-year period was 26,200 cfs.

These flows may not be truly indicative of the natural flows in the watercourse since the operation of dams and associated control works would exert some

influence thereon. The stream flows in the Ottawa River at Grenville would be much greater than at La Cave Rapids located upstream therefrom, due to the numerous tributaries which discharge to the intervening section of the watercourse.

SAMPLING PROCEDURE

The locations of sampling points are shown on the appended map of the Ottawa River. With respect to sampling the Ottawa River water, samples were collected in ranges across the watercourse in order to obtain a representative assessment of water quality. Several samples were taken in each range, and were obtained at a depth of approximately one foot below the surface of the water. "Grab" samples were collected: forty(40) ounces samples for sanitary chemical analysis, and six (6) ounce samples for bacteriological examination being used. Laboratory tests were performed at the Ontario Water Resources Commission Laboratory in Toronto.

The most common analyses of sanitary significance are: Biochemical Oxygen Demand, suspended solids, and the total coliform determination which was obtained by the membrane filter technique.

Biochemical Oxygen Demand(B.O.D.)

The B.O.D. of sewage, industrial wastes or polluted waters, including river waters such as those of the Ottawa in some reaches, is the oxygen required

during stabilization(natural purification in a stream) of the decomposable organic matter or chemical material by aerobic biochemical action. Unless otherwise noted, a 5-day B.O.D. determination is performed, and is reported in parts per million(ppm.). A high B.O.D. is indicative of recent organic or chemical pollution. A desirable upper limit in surfacewater normally is 4 parts per million.

Suspended Solids

These results are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature. Where suspended solids values approach 20 parts per million or less, laboratory difficulties usually are experienced and result in the values being determined as turbidity which is reported in silica units.

Membrane Filter Coliform Count

The membrane filter technique is employed to obtain a direct enumeration of coliform organisms, and the number is reported per 100 millilitres.

Waters having a membrane filter count in excess of the upper limit of 2,400 organisms as determined by this technique, are considered undesirable for municipal water supplies or bathing purposes.

Dissolved Oxygen Tests

Dissolved oxygen(D.O.) tests were performed at each sampling range on the Ottawa River to determine

the dissolved oxygen content of these waters.

SAMPLING CONDITIONS

During the collecting of samples on November 6th, 7th, and 8th, the surface of the Ottawa River was relatively quiescent. Water temperatures varied from 46 to 52 degrees Fahrenheit.

Atmospheric temperatures were in the range of 40 to 50 degrees Fahrenheit. No appreciable precipitation occurred in the watershed during this period.

SAMPLING RESULTS

The results of the laboratory analyses and examinations performed on water samples collected from the Ottawa River and its tributaries during this survey are appended to this report.

Ottawa River

These laboratory results reveal several areas of pollution in the Ottawa River, which appear to coincide with the locations of industrial waste discharges and the sanitary waste discharges from large centres of population. In sections of the river located immediately downstream from some of the pulp and paper mill outfalls, numerous bubbles were observed rising in the river water, suggesting that the wood fibre or other solids discharged to the watercourse there may be undergoing decomposition on the bottom of the river. High B.O.D. contents were

revealed in the river water at such locations, and the odours normally associated with such manufacturing processes were evident. A continuing biological survey should be used to supplement the information contained in this report.

The sanitary chemical and bacteriological quality of the river water was generally satisfactory at Point Fortune where the watercourse totally enters the Province of Quebec.

The laboratory results pertinent to samples collected from the Ottawa River at the Perley Bridge at Hawkesbury reveal an excessive B.O.D. in the watercourse there. This sampling range(No.0.68.0) is located immediately downstream from the pulp and paper mill outfalls there, as well as from domestic waste discharges which may gain access to the river either directly or via West Hawkesbury Creek. The Town of Hawkesbury has no sewage treatment facilities.

Laboratory results pertaining to samples collected from the Ottawa River at Thurso, P.Q., indicate an increase in B.O.D. and coliform content near the Quebec side of the watercourse. This sampling range(No.0.102.3) is located immediately downstream from the mouth of the Blanche River.

Similar conditions were indicated at sampling range No.0.112.C(Cumberland to Masson Ferry), which is

located a short distance downstream from the mouth of the Lievre River.

High B.O.D. and coliform contents were revealed in the river water at the sampling ranges located downstream from the mouth of Green Creek, below Kettle Island, and in the Quebec Channel north of Kettle Island. An excessive B.O.D. was revealed in the waters of the Quebec Channel immediately downstream from a pulp and paper mill. This high B.O.D. appears to persist downstream and is accentuated near the Quebec shoreline. The localized nature of this condition is indicated by the satisfactory values obtained at Gatineau Point(sampling range No.0.127.1) located upstream yet still below the Ottawa-Hull area.

At sampling range No.0.128.5, located at the Ottawa Rowing Club downstream from the Interprovincial Bridge at Ottawa and Hull, and at the bridge itself, the high coliform contents revealed here reflect the waste flows discharged to the river from the Cities of Ottawa and Hull where there are no sewage treatment facilities. Pulp and paper mills located in both cities discharge industrial wastes to the river.

Less pollution was indicated in the river water upstream at the Chaudiere Bridge although a high coliform content was revealed near the Quebec side.

Upstream from the City of Ottawa, no significant

pollution was revealed for approximately 240 miles, despite the fact that numerous tributaries of the Ottawa River receive untreated sewage flows from municipalities. Near the mouth of Kipawa Creek, however, high B.O.D. values were revealed in the river water. The satisfactory conditions indicated in the river upstream from the creek mouth suggest that deoxygenating wastes discharge from Kipawa Creek.

Tributaries of the Ottawa River

Of the tributaries to the Ottawa River which were sampled during this survey, generally satisfactory conditions with respect to sanitary quality were revealed in all but three of these tributaries during this period.

Adverse conditions were found in the waters of the following tributaries at their confluence with the Ottawa River:

Green Creek
Watts Creek
Kipawa Creek

Green Creek receives treated sewage flows from the Urbandale subdivision sewage treatment plant located within the City of Ottawa. This is a temporary, secondary type treatment plant that usually provides a high quality effluent. Other discharges to this creek may occur to an extent which is not immediately known. Although a rather high coliform content was revealed in the creek waters, the B.O.D. content was only slightly in excess of the acceptable limit.

At such time as the Green Creek collector sewer will have been completed, the Urbandale sewage treatment plant will be abandoned. These flows then will be treated at the new City of Ottawa sewage treatment plant.

Watts Creek was receiving the partially treated sewage flows from the Township of Nepean sewage treatment plant. The existing plant is of a temporary nature and is being replaced by a permanent installation. The low dissolved oxygen content(1.0 ppm.) of the waters of this creek near its mouth suggests that the stream was approaching septicity.

The laboratory results pertaining to samples collected from Kipawa Creek near its mouth, and also from this same watercourse upstream from Timiskaming, P.Q., reveal that this lower section of the creek is grossly polluted by deoxygenating wastes. Reportedly, this section receives domestic sewage flows from Timiskaming, and industrial waste discharges from a pulp mill there which utilizes the sulphite process.

Although the sample results of this Ottawa River survey have not so revealed at this time of year, there are numerous other tributaries of the section of the Ottawa River surveyed which receive untreated sewage flows from municipalities located upstream on these tributary watercourses. In some instances, previous sampling on specific tributaries has revealed varying degrees of pollution resulting from these untreated waste discharges. In this sampling programme conducted during the period of

November 6th to 8th, 1961, only one set of samples was obtained from the complete watercourse, which may not permit complete assessment of the varying pollution patterns which may occur.

SUMMARY

The laboratory results of tests performed on samples collected from the Ottawa River and the mouths of many of its tributaries from Point Fortune to Timiskaming during the period of November 6th to 8th, 1961, revealed several areas having water quality impairment. In most of such instances, the zone of recovery of the river water appears to have been relatively short, with self-purification and perhaps sedimentation having restored the water quality to acceptable limits with respect to B.O.D., solids, and coliform content. This season of the year would be expected to provide better conditions than during the summer months. It is emphasized that only one set of samples was collected at this time. Continued sampling may be necessary to assess conclusively the sanitary quality of the watercourse during varying seasonal conditions.

Although localized sections of the watercourse appear to be adversely affected to varying degrees with respect to sanitary chemical quality, the overall effects resulting thereto from waste discharges may not be immediately discernible. The biological life in the river, particularly on the bottom, may have been affected.

Although the Ottawa River and its tributaries receive numerous untreated sanitary and industrial waste discharges, the areas most significantly affected thereby, as indicated by the sample results, are those sections of the watercourse located in and immediately downstream from Ottawa and Hull, below Timiskaming, and at Hawkesbury. Large volumes of sanitary and industrial wastes are discharged to the river in this general area. The City of Ottawa has embarked on a program to provide works for the collection and primary treatment of its sewage flows.

RECOMMENDATIONS

In order to restore the sanitary chemical and bacteriological qualities of the Ottawa River water to acceptable limits, and to maintain a satisfactory standard of water quality therein, adequate treatment of all sanitary and industrial wastes discharged to the watercourse and its tributaries should be provided. Maximum diffusion of effluent into the stream needs to accompany this treatment.

Future surveys will be required in order to locate and assess all outfalls. Continuing biological surveys would be desirable. The present and potential future requirements of the Ottawa River as a source of

water supply, as well as for other uses, accentuate the necessity for undertaking such action.

Sampling of the Ottawa River should be repeated during different seasonal conditions in order to assess further the quality of these waters.

R I V E R S U R V E Y

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Sàtur. of D.O.	BACTERIOLOGICAL LAB. Lab. No.	MF Coliform Count/100 ml.
				Total	Susp.	Diss				
Nov. 8	o.56.0	R-4933	3.2	84	--	--	2.9		R-13502	344
		R-4934	2.4	82	--	--	2.3	87	R-13503	314
		R-4935	2.8	86	--	--	3.6		R-13504	228
Nov. 8	0.68.0	R-4928	3.4	124	--	--	7.0		R-13497	0
		R-4929	76.0	280	--	--	10.0	72	R-13498	930
		R-4930	25.0	130	--	--	7.0		R-13499	370
		R-4931	10.0	76	--	--	4.0	82	R-13500	306
		R-4932	2.4	82	--	--	4.5		R-13501	332

OTTAWA RIVER AT POINT FORTUNE FERRY

R-4933 1/4 of distance across river.
R-4934 1/2 " " " " - D.O. 10.1; Sample Temp. 9.0
R-4935 3/4 " " " "

OTTAWA RIVER AT INTERPROVINCIAL BRIDGE, HAWKESBURY

R-4928 1st channel near south bank.
R-4929 2nd channel from south bank. -D.O. 8.3; Sample Temp. 8.8
R-4930 1/4 of distance across main channel
R-4931 1/2 " " " " " -D.O. 9.7; Sample Temp. 8.5
R-4932 3/4 " " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB., Lab. No.	MF Coliform Count/100 ml.
				Total	Susp.	Diss.				
Nov. 8	0.73.2	R-4925	2.2	78	--	--	2.9	79	R-13494	0
		R-4926	2.6	76	--	--	2.3		R-13495	0
		R-4927	2.6	42	--	--	1.8		R-13496	0
Nov. 8	0.82.0	R-4817	2.3	72	--	--	2.1	90	R-13415	900
		R-4818	2.8	74	--	--	2.3		R-13416	5,400
		R-4819	2.1	82	--	--	3.5		R-13417	58
Nov. 7	0.SN.95.4	R-4809	2.6	322	--	--	9.5		R-13405	76

OTTAWA RIVER AT L'ORIGNAL

R-4925 ¼ of distance across river
R-4926 ½ " " " " - D.O. 9.3; Sample Temp. °C 8.8
R-4927 3/4" " " "

OTTAWA RIVER AT LEFAIVRE-FASSET FERRY

R-4817 ¼ of distance across river
R-4818 ½ " " " " - D.O. 10.5; Sample Temp. °C 9.1
R-4819 3/4" " " "

SOUTH NATION RIVER - AT MOUTH

R-4809

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB. Lab. No.	BACTERIOLOGICAL LAB. MF Coliform Count/100 ml.
Nov. 7	0.102.3	R-4813	2.8	80	--	--	2.8		R-13395	240
		R-4814	1.9	62	--	--	2.5		R-13396	290
		R-4815	3.3	68	--	--	2.6		R-13397	1,100
		R-4816	7.2	88	--	--	3.5	96	R-13398	7,900
Nov. 7	0.112.0	R-4810	2.4	70	--	--	2.6		R-13392	8,600
		R-4811	6.2	84	--	--	2.6	96	R-13393	242
		R-4812	7.0	76	--	--	2.3		R-13394	4,000

OTTAWA RIVER AT FERRY TO THURSO, P.Q.-DOWNSTREAM FROM MOUTH OF BLANCHE RIVER

R-4813 ¼ of distance across river
R-4814 ½ " " " "
R-4815 3/4 " " "
R-4816 At Quebec Shore " " - D.O. 11.2; Sample Temp. °C 9.8

OTTAWA RIVER AT CUMBERLAND-MASSON FERRY

R-4810 ¼ of distance across Ottawa River - D.O. –; Sample Temp. °C –
R-4811 ½ " " " " " - D.O. 11.0; Sample Temp. °C 9.8
R-4812 3/4 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: See below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 7	OL.113.2	R-4808	3.6	58	--	--	2.5	97	R-13404	1,200
		R-4807	3.8	46	--	--	2.5		R-13403	196
Nov. 7	0.120.3	R-4804	7.2	64	--	--	5.5		R-13400	18,600
		R-4805	3.1	56	--	--	2.6		R-13401	20,400
		R-4806	12.0	92	--	--	3.5		R-13402	17,100
Nov. 7	OGR.120.5	R-4803	6.2	114	--	--	5.5		R-13399	8,900
Nov. 7	0.123.4	R-4798	2.8	60	--	--	2.6		R-13410	6,800
		R-4799	2.7	68	--	--	2.8		R-13411	6,100
		R-4800	2.7	60	--	--	2.3		R-13412	9,800
		R-4801	2.8	70	--	--	2.6	97	R-13413	3,700
		R-4802	37.0	148	--	--	9.5		R-13414	15,400

R-4808 Lievre River - at west mouth - D.O. 11.2; Sample Temp. °C 9.5
R-4805 " " - at east mouth

OTTAWA RIVER - BELOW MOUTH OF GREEN CREEK
R-4804 ¼ of distance across river
R-4805 ½ " " " "
R-4806 3/4 " " " "

R-4803 GREEN CREEK - AT MOUTH

OTTAWA RIVER - BELOW KETTLE ISLAND
R-4798 At Ontario Shore
R-4799 ¼ of distance across river
R-4800 ½ " " " "
R-4801 3/4" " " " - D.O. 11.1; Sample Temp. °C 9.9
R-4802 At Quebec Shore

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	PerCent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 7	OQ.124.4	4R-4794	3.1	70	--	--	2.5		R-13406	4,900
		R-4795	2.6	70	--	--	2.6		R-13407	12,900
		R-4796	3.8	70	--	--	2.9		R-13408	11,300
		R-4797	125.0	372	--	--	24.0	88	R-13409	770
Nov. 6	0.127.1	R-4791	3.5	64	--	--	2.8		R-13381	900
		R-4792	3.6	48	--	--	2.3	97	R-13382	2,000
		R-4793	3.0	70			2.5		R-13383	1,400
Nov. 6	OG.127.5	R-4790	1.2	38	--	--	2.1		R-13380	16

OTTAWA RIVER - QUEBEC CHANNEL-BELOW PAPER MILL OUTFALL AT GATINEAU, P.Q.

R-4794 1/5 of distance across channel
R-4795 2/5 " " " "
R-4796 3/5 " " " "
R-4797 4/5 " " " " - D. O. 10.0; Sample Temp.°C 10.0

OTTAWA RIVER AT GATINEAU POINT

R-4791 ¼ of distance across river
R-4792 ½ " " " " - D. O. 11.0; Sample Temp.°C 10.2
R-4793 3/4 " " " "

R-4790 GATINEAU RIVER AT MOUTH

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	PerCent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	OLC.128.3	R-4789	2.0	78	--	--	4.5		R-13379	1,090
Nov. 6	OBR.128.6	R-4784	3.0	80	--	--	2.6		R-13391	200
Nov. 8	OR.128.2	R-4921	2.7	168	--	--	2.0		R-13548	104
		R-4920	2.3	168	--	--	2.3		R-13547	56
Nov. 6	O.128.5	R-4785	4.0	76	--	--	2.6		R-13375	14,400
		R-4786	3.4	72	--	--	2.8		R-13376	2,600
		R-4787	3.6	72	--	--	2.8	91	R-13377	68
		R-4788	6.4	86	--	--	3.5		R-13378	1,700

R-4789 LAKE CREEK - AT MOUTH

R-4784 BREWERY CREEK - AT MOUTH

RIDEAU RIVER AT MOUTH

R-4921 west side
R-4920 east side

OTTAWA RIVER - AT OTTAWA ROWING CLUB

R-4785 1/5 of distance across
R-4786 2/5 " " "
R-4787 3/5 " " " - D. O. 10.3; Sample Temp. °C 10
R-4788 4/5 of distance across

R I V E R   S U R V E Y

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	0.129.0	R-4779	3.1	68	--	--	2.6		R-13386	13,900
		R-4780	3.8	76	--	--	2.6		R-13387	8,900
		R-4781	3.6	78	--	--	2.8	92	R-13388	14,400
		R-4782	4.1	78	--	--	2.6		R-13389	8,400
		R-4783	4.5	82	--	--	2.9		R-13390	7,100
Nov. 8	0.130.2	R-4915	1.4	90	--	--	2.9		R-13542	138
		R-4916	1.0	88	--	--	3.5	106	R-13543	82
		R-4917	1.1	88	--	--	3.6		R-13544	128
		R-4918	1.9	76	--	--	3.3	95	R-13545	102
		R-4919	1.9	84	--	--	3.5		R-13546	6,800

OTTAWA RIVER AT INTERPROVINCIAL BRIDGE IN CITY OF OTTAWA

R-4779 1/6 of distance across river
R-4780 1/3 " " " "
R-4781 ½ " " " " - D. O. 10.3; Sample Temp. °C 10.5
R-4782 2/3 " " " "
R-4783 5/6 " " " "

OTTAWA RIVER AT CHAUDIERE BRIDGE

R-4915 1/6 of distance across river
R-4916 1/3 " " " " - D. O. 12.6; Sample Temp. °C 8.6
R-4917 ½ " " " "
R-4918 2/3 " " " " - D. O. 11.4; Sample Temp. °C 8.0
R-4919 5/6 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 8	0.130.8	R-4914	1.6	88	--	--	3.5	94	R-13541	74
		R-4922	2.1	76	--	--	2.8		R-13549	36
		R-4923	2.0	80	--	--	3.3	94	R-13550	44
		R-4924	2.0	64	--	--	3.5		R-13551	142
Nov. 8	0.132.6	R-4909	1.0	84	--	--	2.9	98	R-13536	16
		R-4910	1.4	76	--	--	3.1		R-13537	12
		R-4911	2.0	84	--	--	3.3		R-13538	12
		R-4912	2.0	80	--	--	3.5	110	R-13539	62
		R-4913	1.1	90	--	--	3.6		R-13540	600

OTTAWA RIVER AT C.P.R. BRIDGE DOWNSTREAM FROM LEMIEUX ISLAND

R-4914 1/5 of distance across river - D. O. 11.05; Sample Temp. °C 8.5
R-4922 2/5 " " " "
R-4923 3/5 " " " " - D. O. 11.1; Sample Temp. °C 8.4
R-4924 4/5 " " " "

OTTAWA RIVER AT CHAMPLAIN BRIDGE

R-4909 1/6 of distance across river - D.O. 11.6; Sample Temp. °C 8.4
R-4910 1/3 " " " "
R-4911 ½ " " " "
R-4912 2/3 " " " " - D.O. 12.9; Sample Temp. °C 8.8
R-4913 5/6 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	0.135.3	R-4777	3.3	72	--	--	2.3		R-13384	14
		R-4778	2.1	64	--	--	2.8	87	R-13385	108
Nov. 7	OW.139.2	R-4851	7.6	360	--	--	3.5	7	R-13548	0
Nov. 7	0.160.6	R-4850	2.2	68	--	--	3.3		R-13457	0
		R-4852	1.8	66	--	--	2.3	94	R-13459	0
		R-4853	2.2	68	--	--	3.1		R-13460	0
		R-4854	1.9	66	--	--	2.1		R-13461	0
Nov. 7	0.163.6	R-4849	2.2	66	--	--	2.3		R-13456	0

OTTAWA RIVER-JUST DOWNSTREAM FROM DESCHENES RAPIDS

R-4777 1/3 of distance from south bank
R-4778 2/3 " " " " " - D.O. 10.1; Sample Temp. °C 9.0

WATTS CREEK-AT MOUTH

R-4851 - D.O. 1.0; Sample Temp. °C 5.0

OTTAWA RIVER AT MOORE LANDING - QUYON FERRY

R-4850 1/5 of distance across river
R-4852 2/5 " " " " - D.O. 10.9; Sample Temp. °C 9.0
R-4853 3/5 " " " "
R-4854 4/5 " " " "

R-4849 OTTAWA RIVER AT CHATS FALLS GENERATING STATION

RIVER SURVEY

Watershed. Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB. Lab. No.	MF Coliform Count/100 ml
				Total	Susp.	Diss				
Nov. 7	OC164.0	R-4848	2.5	258	--	--	2.0		R-13455	0
Nov. 7	OMI169.2	R-4847	2.4	128	--	--	2.3		R-13454	0
Nov. 7	OMD169.4	R-4846	1.2	62	--	--	1.5	98	R-13453	0
Nov. 7	0.174.2	R-4843	2.2	64	--	--	2.3		R-13450	0
		R-4844	2.1	68	--	--	2.8		R-13451	0
		R-4845	2.1	54	--	--	2.9		R-13452	0
Nov. 6	OB181.6	R-4842	3.1	86	--	--	2.9	87	R-13449	0

R-4843 Carp River at Mouth

R-4847 Mississippi River at Mouth (Galetta Bridge)

R-4846 Madawaska River at Mouth - Arnprior - D.O. 11.9; Sample Temp. °C7.5

Ottawa River at Sand-Point to Norway Bay Ferry

R-4843 1/4 of distance across river
R-4844 1/2 " " " "
R-4845 3/4 " " " "

Bonnechere river at Mouth - (Castleford Bridge)

R-4842 - D.O. 10.7; Sample Temp. °C 6.7

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	0.188.6	R-4837	2.4	84	--	--	2.3		R-13444	0
		R-4838	2.3	86	--	--	2.3	90	R-13445	0
		R-4839	2.3	70	--	--	2.8		R-13446	0
		R-4840	2.3	68	--	--	2.8		R-13447	0
		R-4841	2.6	64	--	--	2.6		R-13448	0
Nov. 6	OC.197.1	R-4834	2.2	76	--	--	1.8	88	R-13441	0
		R-4835	1.6	80	--	--	2.3		R-13442	0
		R-4836	2.3	76	--	--	2.1		R-13443	0

OTTAWA RIVER AT CHENAUX GENERATING STATION

R-4837 1/6 of distance across river
R-4838 1/3 " " " " - D.O. 10.7; Sample Temp. °C 8.5
R-4839 ½ " " " "
R-4840 2/3 " " " "
R-4841 5/6 " " " "

OTTAWA RIVER AT CALUMET FALLS DAM

R-4834 ¼ of distance across river - D.O. 10.5; Sample Temp. °C 8.2
R-4835 ½ " " " "
R-4836 3/4 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB.	
				Totals	Susp.	Diss			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	OC.198.9	R-4831	2.1	70	--	--	1.8		R-13438	0
		R-4832	2.4	62	--	--	1.8	90	R-13439	0
		R-4833	1.8	62	--	--	1.7		R-13440	0
Nov. 6	0.209.9	R-4828	3.6	76	--	--	1.8		R-13435	78
		R-4829	2.2	62	--	--	1.5	97	R-13436	24
		R-4830	2.0	60	--	--	1.5		R-13437	0

Ottawa River at Bryson Bridge

R-4831 1/4 of distance across river
R-4832 1/2 " " " " - D.O. 10.7; Sample Temp. °C 8.5
R-4833 3/4 " " " "

Ottawa River at La Passe

R-4828 1/4 of distance across river
R-4829 1/2 " " " " -D.O. 11.3; Sample Temp. °C 9.0
R-4830 3/4 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Satur. of D.O.	BACTERIOLOGICAL LAB. Lab. No.	MF Coliform Count/100 ml.
				Total	Susp.	Diss				
Nov. 6	0.222.1	R-4825	1.9	76	---	--	1.4	102	R-13432	54
		R-4826	1.7	68	--	--	2.0		R-13433	32
		R-4827	2.2	58	--	--	2.3		R-13434	14
Nov. 6	0.237.3	R-4820	2.4	58	--	--	2.5	102	R-13427	286
		R-4821	1.9	66	--	--	1.3		R-13428	142
		R-4822	2.2	72	--	--	1.5		R-13429	134
		R-4823	2.2	64	--	--	1.7		R-13430	178
		R-4824	2.5	68	--	--	1.7		R-13431	82

OTTAWA RIVER AT WALTHAM STATION

R-4825 ¼ of distance across river
R-4826 ½ " " " " - D.O. 11.8; Sample Temp. °C 9.0
R-4827 3/4 " " " "

OTTAWA RIVER AT INTERPROVINCIAL BRIDGE BELOW PEMBROKE

R-4820 1/6 of distance across river
R-4821 1/3 " " " "
R-4822 ½ " " " " - D.O. 11.8; Sample Temp. °C 9.0
R-4823 2/3 " " " "
R-4824 5/6 " " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss.			Lab. No.	MF Coliform Count/100 ml
Nov. 8	OMU241.8	R-4908	1.8	134	-	-	3.3	98	R-13535	200
Nov. 8	0.242.9	R-4903	1.6	76	-	-	2.3		R-13530	0
		R-4904	1.6	66	-	-	2.5		R-13531	0
		R-4905	1.8	72	-	-	1.8	100	R-13532	0
		R-4906	1.5	70	-	-	2.1	-	R-13533	4
		R-4907	4.8	70	-	-	2.0	-	R-13534	4
Nov. 8	0.248.5	R-4898	1.7	72	-	-	1.7		R-13525	0
		R-4899	1.3	66	-	-	2.1		R-13526	0
		R-4900	1.6	70	-	-	1.8	102	R-13527	0
		R-4901	1.7	70	-	-	2.0		R-13528	0
		R-4902	1.6	74	-	-	2.0		R-13529	0

R-4908 Muskrat River at Mouth - D.O. 12.8; Sample Temp. °C 4.5

Ottawa River above Pembroke at Water Works Intake

R-4903 At Ontario side
R-4904 1/4 of distance across river.
R-4905 1/2 of distance across river. - D.O. 11.5; Sample Temp. °C 9.5
R-4906 3/4 of distance across river. - D.O. - ; Sample Temp. °C -
R-4907 at Quebec side of River. - D.O. -;; Sample Temp. °C -

Ottawa River below Petawawa at Fish Hatchery

R-4898 at Ontario Side of river.
R-4899 1/4 of distance across river.
R-4901 3/4 of distance across river.
R-4902 at Quebec side of river.
R-4900 1/2 of distance across river. - D.O. 11.9; Sample Temp. °C 9.0

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB. Lab. No.	BACTERIOLOGICAL LAB. MF Coliform Count/100 ml.
Nov. 8	OP.251.2	R-4897	2.3	44	--	--	1.5		R-13524	16
Nov. 8	0.252.0	R-4887	1.2	54	--	--	2.0	102	R-13514	2
		R-4888	1.0	52	--	--	2.3		R-13515	4
		R-4889	1.4	54	--	--	1.8		R-13516	0
		R-4895	1.2	68	--	--	1.7		R-13517	0
		R-4896	1.2	70	--	--	2.0		R-13518	6
Nov. 8	0.269.6	R-4890	1.8	60	--	--	2.1	83	R-13519	28
		R-4891	1.6	68	--	--	1.8		R-13520	0
		R-4892	1.1	74	--	--	2.0		R-13521	0
		R-4893	1.4	68	--	--	2.3		R-13522	0
		R-4894	1.8	64	--	--	2.0		R-13523	0

R-4897 PETAWAWA RIVER - AT MOUTH

OTTAWA RIVER AT PINK ISLAND ABOVE PETAWAWA

R-4887 At Ontario Side of River
R-4888 $\frac{1}{4}$ of distance across river
R-4889 $\frac{1}{2}$ " " " " - D.O. 11.8; Sample Temp. °C 9.5
R-4895 3/4 " " " "
R-4896 Quebec Side of River

OTTAWA RIVER BELOW TOWN OF DEEP RIVER

R-4890 Ontario Side of River
R-4891 $\frac{1}{4}$ of distance across river - D.O. 9.4; Sample Temp. °C 10.5
R-4892 $\frac{1}{2}$ " " " "
R-4893 3/4 " " " "
R-4894 Quebec Side of River

RIVER SURVEY

Watershed: Ottawa River.

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB. Lab. No.	BACTERIOLOGICAL LAB. MF. Coliform Count/100 ml.
Nov. 7	0.283.6	R-4884	1.2	64	--	--	2.5		R-13511	0
		R-4885	1.3	68	--	--	2.0	97	R-13512	4
		R-4886	1.1	70	--	--	2.5		R-13513	0
Nov. 7	0.292.8	R-4881	1.6	68	--	--	2.6		R-13508	6
		R-4882	0.9	68	--	--	2.9	74	R-13509	0
		R-4883	0.9	70	--	--	2.5		R-13510	0
Nov. 7	0.313.8	R-4878	1.5	56	--	--	3.5		R-13505	4
		R-4879	1.5	66	--	--	3.6	69	R-13506	18
		R-4880	1.6	64	--	--	3.6		R-13507	28

OTTAWA RIVER AT DES JOACHIMS GENERATING STATION-UPSTREAM SIDE

R-4884 1/4 of distance across river.
R-4885 1/2 of distance across river. - D.O. 11.3; Sample Temp°C. 9.0
R-4886 3/4 of distance across river.

OTTAWA RIVER AT STONECLIFFE

R-4881 1/4 of distance across river.
R-4882 1/2 of distance across river. - D.O. 8.4; Sample Temp°C. 10.0
R-4883 3/4 of distance across river.

OTTAWA RIVER BELOW DEUX RIVIERES

R-4878 1/4 of distance across river.
R-4879 1/2 of distance across river. - D.O. 8.0; Sample Temp°C. 9.5
R-4880 3/4 of distance across river.

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB. Lab. No.	MF Coliform Count/100 ml.
				Total	Susp.	Diss.				
Nov. 7	0.335.9	R-4875	1.8	68	-	-	4.5		R-13476	0
		R-4876	1.9	62	-	-	4.0	79	R-13477	0
		R-4877	2.0	70	-	-	4.0		R-13478	0
Nov. 7	OMA336.9	R-4873	1.7	58	-	-	4.0		R-13474	0
		R-4874	1.8	64	-	-	4.5	72	R-13475	0
Nov. 7	0.341.0	R-4870	2.3	64	-	-	5.5		R-13482	0
		R-4871	1.5	58	-	-	5.5	71	R-13483	0
		R-4872	1.5	66			5.5		R-13484	0

OTTAWA RIVER - ONE-HALF-MILE DOWNSTREAM FROM MOUTH OF MATTAWA RIVER

R-4875 1/4 of distance across river.
R-4876 1/2 of distance across river. D.O. 9.1; Sample Temp.°C. 9.5
R-4877 3/4 of distance across river.

MATTAWA RIVER

R-4873 North side of mouth.
R-4874 south side of mouth. - D.O. 8.4; Sample Temp.°C. 9.0

OTTAWA RIVER AT OTTO HOLDEN GENERATING STATION (LA CAVE DAM)

R-4870 1/4 of distance across river.
R-4871 1/2 of distance across river. - D.O. 8.3; Sample Temp.°C. 9.0
R-4872 3/4 of distance across river.

R I V E R   S U R V E Y

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss.			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	0.368.3	R-4867	7.6	76	--	--	5.0	87	R-13479	0
		R-4868	4.1	66	--	--	6.5		R-13480	0
		R-4869	4.0	68	--	--	6.0		R-13481	0
Nov. 6	0.371.3	R-4864	2.8	76	--	--	6.0	86	R-13471	0
		R-4865	3.7	68	--	--	5.5		R-13472	0
		R-4866	4.1	74	--	--	6.5		R-13473	0
Nov. 6	0.372.1	R-4861	1.7	64	--	--	5.0	92	R-13468	0
		R-4862	1.8	66	--	--	3.8		R-13469	0
		R-4863	4.7	104	--	--	5.5		R-13470	0

OTTAWA RIVER -4 MILES DOWNSTREAM FROM MOUTH OF KIPAWA CREEK

R-4867 ¼ cf distance across river
R-4868 ½ " " " " - D.O. 10.4; Sample Temp. °C 8.0
R-4869 3/4 " " "

OTTAWA RIVER - 1 MILE DOWNSTREAM FROM MOUTH OF KIPAWA CREEK

R-4864 ¼ of distance across river
R-4865 ½ " " " " - D.O. 10.4; Sample Temp. °C 7.5
R-4866 3/4 " " "

OTTAWA RIVER - 0.2 MILE DOWNSTREAM FROM THE MOUTH OF KIPAWA CREEK

R-4861 ¼ of distance across river
R-4862 ½ " " " " - D.O. 10.7; Sample Temp. °C 9.0
R-4863 3/4 " " "

RIVER SURVEY

Watershed: Ottawa River

Date Sampled: see below

Date of Sample 1961	Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Percent Saturation of D.O.	BACTERIOLOGICAL LAB.	
				Total	Susp.	Diss.			Lab. No.	MF Coliform Count/100 ml.
Nov. 6	0.372.2	R-4859	18.0	172	-	-	4.0	-	R-13466	0
		R-4860	19.0	206	-	-	5.5	98	R-13467	0
Nov. 6	OK.372.3	R-4858	350.0	1406	-	-	22.0	-	R-13465	0
	OK.373.0	R-4857	0.6	30	-	-	1.7	-	R-13464	0
Nov. 6	0.372.4	R-4855	1.4	62	-	-	5.0		R-13462	0
		R-4856	1.4	60	-	-	5.5	92	R-13463	0

OTTAWA RIVER - 25 FEET DOWNSTREAM FROM MOUTH OF KIPAWA CREEK

R-4859 60 feet from Quebec side.
R-4860 20 feet from Quebec Side. D.O. 11.8; Sample Temp. °C 8.0

R-4858 KIPAWA CREEK AT MOUTH - DOWNSTREAM FROM MILL OUTFALL

R-4857 KIPAWA CREEK UPSTREAM FROM MILL OUTFALL

OTTAWA RIVER AT DAM UPSTREAM FROM MOUTH OF KIPAWA CREEK

R-4855 West Branch of Ottawa River.
R-4856 East branch of Ottawa River. - D.O. 10.8; Sample Temp. °C 8.5

ONTARIO WATER RESOURCES COMMISSION
801 BAY STREET
TORONTO 5

NOV 14 1967
APR 25 1968
SEP 24 1985